

Press Release

February 20, 2014

STORY OF MARINE DEBRIS FROM THE 2011 TSUNAMI IN JAPAN IN MODEL SIMULATIONS AND OBSERVATIONAL REPORTS

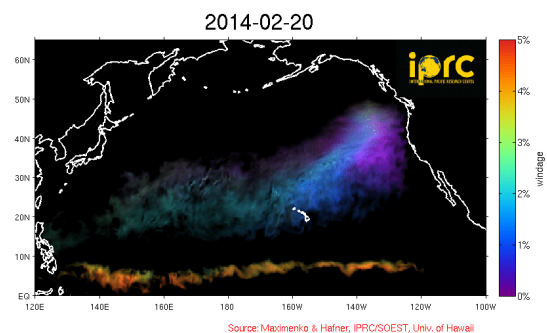
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<http://www.sgmeet.com/osm2014/viewabstract.asp?AbstractID=13323>

The amount of debris in the ocean is growing exponentially, becoming more and more hazardous and harmful to marine life and therefore to our ocean food source. The technology of measuring the movements of such debris is still in its infancy. The driftage generated by the tragic 2011 tsunami in Japan gave Nikolai Maximenko and Jan Hafner, scientists at the University of Hawaii at Manoa International Pacific Research Center, a unique chance to learn about the effects of currents and winds on floating materials as they move across the North Pacific Ocean.

Shortly after the tsunami struck, Maximenko and Hafner used the IPRC Ocean Drift Model to predict where the debris from the tsunami would go. This computer model is based on trajectories of real satellite-tracked drifting buoys and satellite-measured winds.

The model has now been charting the possible paths of the tsunami driftage for nearly 3 years. The scientists have made a major improvement to the initial model: it now accommodates objects of different shapes and buoyancies that expose different amounts of surface to the wind and travel at different speeds and different trajectories. The model therefore now includes different levels of wind-forcing, simulating the movement of different types of floating debris.

Marine debris observing systems capable of verifying the model simulations do not yet exist. The model paths and timeline for tsunami debris, however, agree with random reports of such debris washing up on the shores of Oregon, Washington, Alaska, and the Hawaiian Islands, as well as with observations by sailors crossing the North Pacific.



The possible locations of various types of driftage from the tsunami on February 20, 2014. Orange color depicts likely location of pieces of high buoyancy, blue-purple the likely region of low-buoyancy pieces.



In August –September 2012, many oyster buoys from Japan such as this one that washed up on Kauai, started to arrive on windward shores of Hawaii. Image credit, Carl Berg and Surfrider Foundation Kauai and volunteers.

The first physical evidence of tsunami driftage far from the coasts of Japan, for example, came in October 2011 from the Russian sail training ship *Pallada*. The captain had been forewarned by the IPRC scientists that the ship might run into a tsunami debris field on its voyage from Honolulu to Vladivostok. Sailors, alerted and on the lookout, sighted much debris just northwest of Midway, and picked up a little fishing boat, later confirmed lost in the tsunami.

The model predicted both the timing and the type of material that has washed up along the windward shores of Hawaii: the first tsunami driftage came in August – September 2012, about 1½ years after the tragedy. These were very buoyant pieces, for example, oyster buoys, crates, small fishing boats like the one picked up by *Pallada*, and parts of small refrigerators.

Then 2½ years after the tsunami, materials sitting lower in the water and less buoyant than the previous driftage arrived: poles and beams with mortise and tenon features. Experts on lumber, who have analyzed cross-cuts of several of these wood pieces, agree that it is *Sugi*, a species of cypress endemic to Japan. One piece of wood is of very old timber and must have been cut 100 or more years ago.

The IPRC Ocean Drift Model has recently shown to be useful in another dramatic event at sea: validating the El Salvadoran castaway's ordeal. In January 2014, Jose Salvador Alvarenga washed ashore in the Marshall Islands after enduring a 13-month journey from the shores of southern Mexico. The paths of floating objects in the IPRC Ocean Drift model, driven with the currents and wind conditions, lend strong support to this rather improbable odyssey.

Contacts

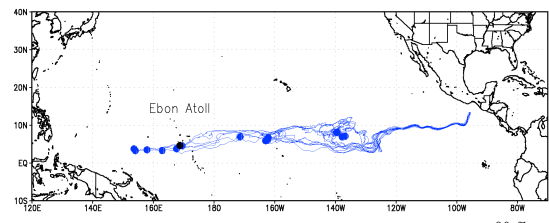
Jan Hafner - email: jhafner@hawaii.edu

Nikolai Maximenko – email: maximenk@hawaii.edu

Gisela Speidel: International Pacific Research Center Outreach – email: gspeidel@hawaii.edu



In Fall-Winter 2013, many wooden poles and beams with mortise and tenon features, such as this gabled roof end of small cabin with metal bracing holding all together and found at Kamilo Pt, started washing up on windward shores of Hawaiian Isles. Credit Hawaii Wildlife Fund.



Path of 16 tracers in the model from December 20, 2012, to January 31, 2014. The black circle is where Alvarenga was found end of January 2014 and the blue circles mark where the tracers were located.

The International Pacific Research Center (IPRC) of the School of Ocean and Earth Science and Technology (SOEST) at the University of Hawaii at Manoa, is a climate research center founded to gain greater understanding of the climate system and the nature and causes of climate variation in the Asia-Pacific region and how global climate changes may affect the region. Established under the "U.S.-Japan Common Agenda for Cooperation in Global Perspective" in October 1997, the IPRC is a collaborative effort between agencies in Japan and the United States.